5.12 NOISE

The Project includes the construction, operation, maintenance, and abandonment of up to 850 megawatts (MW) of capacity by a solar power generating facility and its ancillary systems in two phases (Phase I: 500MW [approximately 5,838 acres]/Phase II 350MW [approximately 2,392 acres]). The Project will consist of up to approximately 34,000 SunCatchers. Construction is anticipated to occur over an approximate four-year period beginning in 2010 and ending in 2014. It is estimated that approximately an average of 400 construction and 180 long-term labor jobs will be required.

The Project is located in an undeveloped area of San Bernardino County, California approximately 37 miles east of Barstow, California and north of Interstate 40 (I-40) between approximately 1,925 to 3,050 feet above mean sea level. The Project is located primarily on Bureau of Land Management (BLM) land within the Barstow Field Office. Approval of the Project Right-of-Way (ROW) Grant Application (Form 299, Applications CACA 49539 and 49537) will result in the issuance of a ROW Grant Permit for use of federal lands administered by the BLM. The Project would require a plan amendment to the 1980 California Desert Conservation Area (CDCA) Plan.

The area where the Project would be constructed is primarily open, undeveloped land within the Mojave Desert. The Cady Mountain Wilderness Study Area (WSA) is located north of the Solar One site. The Pisgah Crater, within the BLM-designated Pisgah Area of Critical Environmental Concern (ACEC), is located south and east of the Project (south of I-40 by several miles). Several underground and above ground utilities traverse the area.

An approved interconnection letter from California Independent Service Operator (CAISO) has been issued for the Project. The associated System Impact Study (SIS) is located in Appendix H. The SIS indicates that additional upgrades to the Southern California Edison (SCE) Lugo-Pisgah No. 2 Transmission Line and upgrades at the SCE Pisgah Substation will be required for the full build out of the 850MW Project. Supplemental studies performed by SCE and CAISO indicate that capacity is available on the existing transmission system to accommodate less than the 850MW Project.

An on-site substation (i.e., Solar One Substation [approximately 3 acres]) will be constructed to deliver the electrical power generated by the Project to the SCE Pisgah Substation. Approximately twelve to fifteen 220kV transmission line structures (90 to 110 feet tall) would be required to make the interconnection from the Solar One Substation to the SCE Pisgah Substation. All of these structures would be constructed within the Project Site.

The Project will include a centrally located Main Services Complex (14.4 acres) that includes three SunCatcher assembly buildings, administrative offices, operations control room, maintenance facilities, and a water treatment complex including a water treatment structure, raw water storage tank, demineralized water storage tank, basins, and potable water tank.

Adjacent to the Main Services Complex, a 14-acre temporary construction laydown area will be developed and an approximately 6-acre construction laydown area will be provided adjacent to the Satellite Services Complex south of the Burlington Northern Santa Fe (BNSF) railroad. Two additional construction laydown areas (26 acres each) one will be located at the south entrance off Hector Road and the other at the east entrance just north of the SCE Pisgah Substation.

Temporary construction site access would be provided off of I-40 beginning east of the SCE Pisgah Substation and would traverse approximately 3.5 miles across the Pisgah ACEC requiring an approximate 30-foot ROW. Long-term permanent access would be provided by a bridge over the BSNF railroad along Hector Road north of I-40. Equipment may be transported during construction via trucks and/or rail car (through the construction of a siding), that would be located on the north side of BNSF railroad and east of Hector Road or as authorized by BNSF.

Water would be provided via a groundwater well located on a portion of the BLM ROW north of the Main Services Complex and transported through an underground pipeline. The expected average well water consumption for the Project during construction is approximately 50 acre-feet per year. Under normal operation (inclusive of mirror cleaning, dust control, and potable water usage), water required will be approximately 36.2 acre-feet per year. Emergency water may be trucked in from local municipalities.

The following section discusses noise related to the construction, operation, maintenance, and de-commissioning of the Project.

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity and that interferes with or disrupts normal activities. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, the perceived importance of the noise and its appropriateness in the setting, the time of day, the type of activity during which the noise occurs, and the sensitivity of the individual.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by several variables, including frequency and intensity. Frequency describes the pitch of the sound and is measured in Hertz (Hz), while intensity describes the sound's loudness and is measured in decibels (dB). Decibels are measured using a logarithmic scale. A sound level of 0dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60dB. Sound levels above approximately 110dB begin to be felt inside the human ear as discomfort and eventually pain at 120dB and higher levels. The minimum change in the sound level of individual events that an average human ear can detect is about 1 to 2dB. A 3 to 5dB change is readily perceived. A positive change in sound level of about 10dB is usually perceived by the average person as a doubling of the sound's original loudness, while -10dB would be perceived as a halving of the sound's loudness.

Because of the logarithmic nature of the decibel unit, multiple sound levels cannot be algebraically added or subtracted directly and are thus somewhat cumbersome to handle mathematically; however, some simple rules are useful in dealing with sound level addition. For instance, if a sound's intensity is doubled, or two identical sound levels are added together, the resulting sound level increases by 3dB, regardless of the initial sound level. Examples include as follows: 60dB + 60dB = 63 dB, and 80dB + 80dB = 83dB.

Sound level is usually expressed by reference to a known standard. This report refers to sound pressure level (SPL). In expressing sound pressure on a logarithmic scale, the sound pressure is compared to a reference value of 20 micropascals. Sound pressure level depends not only on the

power of the source, but also on the distance from the source and on the acoustical characteristics of the space surrounding the source, the receiver, and the path between them.

Hertz (Hz) is a measure of how many times each second the crest of a sound pressure wave passes a fixed point. For example, when a drummer beats a drum, the skin of the drum vibrates a number of times per second. When the drum skin vibrates 100 times per second it generates a sound pressure wave that is oscillating at 100Hz, and this pressure oscillation is perceived by the ear/brain as a tonal pitch of 100Hz. Sound frequencies between 20 and 20,000Hz are within the range of sensitivity of the best human ear.

Sound from a tuning fork contains a single frequency (a pure tone), but most sounds one hears in the environment do not consist of a single frequency but rather a broad band of frequencies differing in sound level. The method commonly used to quantify environmental sounds consists of evaluating all frequencies of a sound according to a weighting system that reflects the hearing function of the human ear, which is less sensitive at low and extremely high frequencies but more sensitive through the mid-range of audible frequencies. This method is called "A weighting," and the resulting dB level is called the A-weighted decibel (dBA). In practice, the dBA level of a noise source is conveniently reported using a sound level meter that includes a filter, corresponding to the dBA weighting curve, which adjusts measured sound by an appropriate dB quantity at each octave or one-third octave band, depending on the resolution of the instrument.

Although the dBA value may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a mixture of noise from distant sources that creates a relatively steady background noise in which no particular source is identifiable. A single descriptor called the equivalent sound level (L_{eq}) may be used to describe sound that is changing in the level. L_{eq} is the energy-mean dBA during a measured time interval. It is the "equivalent" constant sound level that would have to be produced by a given source to equal the acoustic energy contained in the fluctuating sound level measured. In addition to the energy-average level, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the maximum L_{eq} (L_{max}) and minimum L_{eq} (L_{min}) indicators that represent the root-mean-square maximum and minimum noise levels measured during the monitoring interval. The L_{min} value obtained for a particular monitoring location is often called the acoustic floor for that location.

To describe time-varying character of environmental noise, the statistical noise descriptors L_{10}, L_{50}, and L_{90} are commonly used. They are the noise levels equaled or exceeded by 10 percent, 50 percent, and 90 percent of the measured time interval. Sound levels associated with the L_{10} typically describe transient or short-term events, half of the sounds during the measurement interval are softer than L_{50} and half are louder, while levels associated with L_{90} often describe background noise conditions and/or continuous, steady-state sound sources. Because they are statistical descriptors, L_{10}, L_{50}, and L_{90} values depend greatly on the duration of the measured interval. For instance, if a chainsaw is operated for only one minute in an otherwise quiet wooded forest, the L_{10} value over a ten-minute measurement containing the chainsaw operation will be much higher than the reported value for a longer measurement period. In other words, the noisy chainsaw operation would occur less than 10 percent of the longer measurement interval and therefore result in a much lower L_{10} value.

Finally, another sound measure known as the community noise equivalent level (CNEL) is defined as the A-weighted average sound level for a 24-hour day. It is calculated by adding a 5dB penalty to sound levels during the evening period (7 p.m. to 10 p.m.) and a 10dB penalty to sound levels during the night period (10 p.m. to 7 a.m.) to compensate for the increased sensitivity to noise during the quieter evening and nighttime hours. The day/night average sound level (L_{dn}) also represents the average sound level for a 24-hour day and is calculated by adding a 10dB penalty only to sound levels during the night period. The CNEL and L_{dn} are typically used to define acceptable land use compatibility with respect to noise. Because of the time-of-day penalties associated with the CNEL and L_{dn} descriptors, the L_{eq} for a continuously operating sound source during a 24-hour period will be numerically less. Thus, for a power plant operating continuously for periods of 24 hours, the L_{eq} will be 6dB lower than the L_{dn} value and 7dB lower than the CNEL value.

But, for a facility that only operates during daytime hours, with evening and nighttime background sound levels being significantly quieter, L_{eq} can closely approach the corresponding L_{dn} and CNEL values over the same 24-hour period. Sound levels of typical noise sources and environments are provided in Table 5.12-1, Sound Levels of Typical Noise Sources and Noise Environments, to provide a frame of reference.

Table 5.12-1
Sound Levels of Typical Noise Sources and Noise Environments

Noise Source (at a given distance)	Scale of A-Weighted Sound Level in Decibels	Noise Environment	Human Judgment of Noise Loudness
Military jet take-off with after-burner (50 feet), civil-defense siren (100 feet)	140, 130	Aircraft carrier flight deck	
Commercial jet take-off (200 feet)	120	Thunderclap	Threshold of pain 32 times as loud[1]
Pile driver (50 feet)	110	Rock music concert	Average human ear discomfort 16 times as loud[1]
Ambulance siren (100 feet), newspaper press (5 feet), power lawn mower (3 feet)	100		Very loud 8 times as loud[1]
Motorcycle (25 feet), propeller plane flyover (1,000 feet), diesel truck, 40 miles per hour (50 feet)	90	Boiler room printing press plant	Likely damage, 8-hour exposure 4 times as loud[1]
Garbage disposal (3 feet)	80		Possible damage, 8-hour exposure 2 times as loud[1]
Passenger car, 65 miles per hour (25 feet), vacuum cleaner (10 feet)	70	Data processing center, department store	Reference loudness moderately loud[1]
Normal conversation (5 feet), air conditioning unit (100 feet)	60	Private business office, restaurant	1/2 as loud[1]
Light traffic (100 feet)	50	Lower limit of daytime urban ambient sound	1/4 as loud[1]

Table 5.12-1
Sound Levels of Typical Noise Sources and Noise Environments

Noise Source (at a given distance)	Scale of A-Weighted Sound Level in Decibels	Noise Environment	Human Judgment of Noise Loudness
Bird calls (distant)	40	Quiet urban nighttime	1/8 as loud[1]
Soft whisper (5 feet)	30	Recording studio, library	Very quiet 1/16 as loud[1]
	20	Whistling, rustling leaves	Just audible 1/32 as loud[1]
	10	Breathing	Barely audible 1/64 as loud
	0		Threshold of hearing 1/128 as loud[1]

Source: URS Corporation, 2008.
Note:
[1] Relative to a reference loudness of 70 decibels.

5.12.1 Affected Environment

In accordance with California Energy Commission (CEC) regulations, this section describes the existing noise environment within an area bounded by a 2-mile-radius of the property line perimeter of the Project. Noise-sensitive receivers that may be affected are identified, as well as the laws, ordinances, regulations, and standards (LORS) that regulate noise levels at those receivers.

5.12.1.1 Project Site

The major noise-producing Project components are located within an approximate 8,230-acre Project Area (as shown in Figure 5.12-1, Sound Level Measurement Locations and L_{eq} Noise Contours).

Some land uses are considered sensitive to noise. Based on CEC guidelines, residences, hospitals, libraries, schools, places of worship, or other facilities where quiet is an important attribute of the environment are considered to be noise-sensitive land uses. The nearest communities to the Project Site are Daggett and Newberry Springs, which are approximately 13 miles east and 17 miles west, respectively.

The nearest residence to the east side of the Project Site is located approximately 7,700 feet east of the Project boundary (indicated as SR2 on Figure 5.12-1, Sound Level Measurement Locations and L_{eq} Noise Contours). The nearest residence to the southwest of the Project Site is located approximately 1,200 feet south of the Project boundary, south of U. S. Route 66 and west of Hector Road (indicated as SR1 on Figure 5.12-1). The land north of the Project boundary is open land designated as the Cady Mountain WSA. No noise-sensitive outdoor usable areas were identified in the WSA.

5.12.1.2 Transmission Line

The 220-kilovolt (kV) single-circuit transmission line for the Project will be a direct inter-tie between the proposed Solar One Substation and the SCE single-circuit transmission line to the existing SCE Pisgah Substation. The interconnection transmission line will be up to 1 mile long, along the BNSF Railroad due east and to the SCE Pisgah Substation due south. The land is relatively flat with little fluctuations in topography and is covered by native vegetation. As a result of relatively flat topography, there is an unobstructed line of sight from this existing substation to the Project Site. The nearest residence to the proposed interconnection transmission line is located approximately 9,000 feet east of the SCE Pisgah Substation. No other land developments are known to exist in the vicinity (i.e., within a 1-mile radial distance) of this proposed transmission line and the SCE Pisgah Substation.

5.12.1.3 Water Supply Pipeline

A water supply pipeline will be constructed from a ground water well located within the Project boundary to the Main Services Complex. See Figure 5.12-1, Sound Level Measurement Locations and L_{eq} Noise Contours, for the location of the proposed water well.

5.12.1.4 Ambient Noise Measurements

A series of long- and short-term sound level measurements were conducted during a Project Site survey from November 2 to November 7, 2008, for the purpose of characterizing the existing noise environment near the Project. Measurement locations ST1, ST3, and LT3 are short (i.e., distinguished by the "ST" prefix) and long-term (prefixed with "LT") locations representing existing residences in proximity to the Project Area. ST2 is a short-term measurement in the vicinity of the rail line. LT1 and LT2 are long-term measurements along the eastern boundary of the Project Area. LT2 also represents the ambient sound level for the proposed transmission line. ST4 is a short-term measurement location at the existing Pisgah substation.

All sound level meters were equipped with windscreens and set for slow time-response and usage of the dBA scale. The instruments were field-calibrated before and after each measurement period with acoustic calibrators. Sound level measurement conducted by URS was guided by appropriate techniques as defined by the International Standards Organization (namely, 1996a, 1996b, 1996c).

During the survey period, weather conditions varied. The measured air temperature readings ranged from 45 to 78 degrees Fahrenheit, with 26 to 54 percent relative humidity. Winds were intermittent and gusty with averages ranging from 0 to 11 miles per hour. Appendix CC, Noise Measurements, includes field notes that document these environmental conditions as part of the sound measurement survey.

The short-term measurements were conducted with two Larson Davis Model 820 American National Standards Institute (ANSI) Type 1 Sound Level Meters (SLM) having serial numbers 1324 and 1655. Each SLM was mounted on a tripod roughly 5 feet above the ground to simulate the average height of the human ear above grade. Table 5.12-2, Short-Term Noise Measurement Data Summary, presents the results from the short-term measurements taken at the indicated ambient measurement locations.

Table 5.12-2
Short-Term Noise Measurement Data Summary

Site ID	Measurement Location	Measurement Period			Measurement Results (dBA)				
		Start Time	End Time	Duration (minutes)	L_{eq}	L_{10}	L_{50}	L_{90}	Ldn
ST1[1]	North of U.S. Route 66, west of Hector Road, and west of the residence	11:25	12:25	60	57	61	54	47	63
		23:15	00:15	60	56	61	53	42	
ST2[2]	West of Hector Road, south of rail line	14:50	15:20	30	37	39	35	34	85
		00:30	01:00	30	79	81	43	38	
ST3[1,2]	At resident gate post to the east of the Project Area, north of the rail line and I-40	16:45	17:45	60	68	55	41	34	74
		23:20	00:20	60	68	70	46	40	
ST4	Northeastern gate of SCE Pisgah Substation	14:10	14:30	20	45	47	41	40	56
		00:30	00:50	20	50	53	48	41	

Source: URS Corporation, 2008.

Notes:

dBA = A-weighted decibel
ID = identification
L_{10} = noise level exceeded 10 percent of the measurement period
L_{50} = noise level exceeded 50 percent of the measurement period
L_{90} = noise level exceeded 90 percent of the measurement period
L_{eq} = equivalent sound level
Ldn = Day Night Average Sound Level

[1] Representative Noise Sensitive Receiver. Measurement location was set up near the residential property line due to safety concerns and accessibility.

[2] ST2 nighttime measurement included train pass-by. ST3 measurements included train pass-by.

The long-term measurements were conducted using two Larson Davis ANSI Type 2 integrating sound level meters: one Model 720 meter (serial number 0395) and one Model 712 meter (serial number 0418). With only the microphones and windscreens exposed to the outdoor environment, the meters were each placed in a locked, weather-resistant case. The long-term measurements consisted of averages from consecutive 5-minute measurement intervals. The instruments were checked for calibration and adjusted as needed in the field before and after each measurement period with an acoustic calibrator (CAL 150B serial number 2233). Table 5.12-3, Long-Term Noise Measurement Data Summary, summarizes the results from the synchronous long-term measurements taken at the indicated ambient measurement locations. See Figure 5.12-1 for sound level measurement locations.

High wind speeds, with average velocities exceeding normal thresholds for obtaining good sound measurement data, caused the long term measurement at LT1 to be interrupted. Table 5.12-3 shows that usable data was still collected over a six-hour continuous period.

Table 5.12-3
Long-Term Noise Measurement Data Summary

Site ID	Measurement Location	Measurement Period			Measurement Results (dBA)				
		Start Time	End Time	Duration (hours)	L_{eq}	L_{10}	L_{50}	L_{90}	Ldn
LT1[1]	Northeastern boundary of Project Area	13:35	20:15	6.6	49	49	46	44	-
LT2[2]	Southeastern boundary of Project Area, north of the rail tracks	13:40	13:40	24	75	54	45	42	81
LT3[3]	North of U.S. Route 66, west of Hector Rd, and east of the residence	13:00	14:00	25	64	68	60	50	70

Source: URS Corporation, 2008.

Notes:

dBA = A-weighted decibel
ID = identification
L_{10} = noise level exceeded 10 percent of the measurement period
L_{50} = noise level exceeded 50 percent of the measurement period
L_{90} = noise level exceeded 90 percent of the measurement period
L_{eq} = equivalent sound level
Ldn = Day Night Average Sound Level

[1] Due to the high wind speeds, the sound level data after 20:15 was not processed. Ldn is not available.

[2] LT2 measurement included train pass-by.

[3] Representative Noise Sensitive Receiver. Measurement location was set up near the residential property line due to safety concerns and accessibility.

Project Vicinity

ST1

The nearest residence was identified at the southwestern project area (south of Route 66, west of Hector Road). An equivalent short-term noise measurement was established about 0.3 miles to the west of the residence and just north of U.S. Route 66. This measurement setup is shown in photos 1 and 2 of Appendix CC, Noise Measurements.

The daytime short-term measurement was conducted between 1125 and 1225 on November 3, 2008. Daytime noise sources included wind gusts and traffic contributions from I-40. The nighttime short-term measurement was conducted between 2315 and 0015 on November 3, 2008. The nighttime noise sources included wind noise and traffic contributions from I-40. The daytime and the nighttime L_{eq} levels are shown in Table 5.12-2, Short-Term Noise Measurement Data Summary.

ST2

This measurement location was north of I-40, south of the rail line and just west of Hector Road. Daytime and nighttime short-term measurements were conducted at this location. Measurement setup is shown in photos 3 and 4 of Appendix CC, Noise Measurements.

The daytime short-term measurement was conducted between 1450 and 1520 on November 3, 2008. Daytime noise sources included wind gusts, bird vocalization, commercial and unidentifiable jet planes (distant and close), and distant traffic noise contribution from I-40. The nighttime short-term measurement was conducted between 0030 and 0100 on November 4, 2008. The nighttime noise sources included wind noise, train pass-bys from the nearby rail line, and

distant traffic noise contribution from I-40. The daytime and the nighttime L_{eq} levels are shown in Table 5.12-2, Short-Term Noise Measurement Data Summary.

ST3

This measurement location was at the fence line of the resident property to the east of the Project Area, north of the rail line and I-40. Short-term daytime and nighttime measurements were conducted at this location. Measurement setup is shown in Photographs 5 and 6 of Appendix CC, Noise Measurements.

The daytime short-term measurement was conducted between 1645 and 1745 on November 6, 2008. Daytime noise sources included unidentifiable aircraft, distant traffic noise contribution from I-40, and train pass-bys from the nearby rail line. Access permission was not obtained at the time of measurement, so measurements were not taken at the location of the actual residence (SR1) within the property line. However, the ambient noise environment was assumed to be similar to SR1 and it was determined ST3 ambient noise levels would be representative to SR1. The nighttime short-term measurement was conducted between 2320 and 0020 on November 6, 2008. The nighttime noise sources included distant traffic contribution from I-40 and train pass-bys from the nearby rail line. The daytime and the nighttime L_{eq} levels are shown in Table 5.12-2, Short-Term Noise Measurement Data Summary.

LT1

This measurement location was placed at the northeastern corner of the Project Area boundary. The dominant noise sources at this location were gusty wind and transmission lines. Usable sound data was collected at this location for a period of about 6.6 hours. However, measurements at this location were truncated after that time due to a windscreen failure. The meter was attached to a telephone pole in a locked weatherproof box. The measurement setup is shown in Photographs 9 and 10 of Appendix CC, Noise Measurements. A summary of the data from this long-term measurement can be found in Table-5.12-3, Long-Term Noise Measurement Data Summary, and hourly data for this location can be found in Appendix CC, Noise Measurements.

LT2

This measurement location was at the southeastern corner of the Project Area boundary, near the proposed transmission line. The dominant noise source at this location was train pass-bys. A long-term measurement was conducted for a period of 24 hours. The meter was attached to a barbed wire fence line in a locked weatherproof box. The measurement setup is shown in photo 11 in Appendix CC, Noise Measurements. A summary of the data from this long-term measurement can be found in Table-5.12-3, Long-Term Noise Measurement Data Summary, and hourly data for this location can be found in Appendix CC, Noise Measurements.

LT3

This measurement location was situated in the vicinity of the residence to the south of Route 66 and west of Hector Road. This is a long-term measurement conducted for a period of 25 hours. The dominant noise source at this location was the vehicular traffic from I-40. The meter was attached to a telephone pole in a locked weatherproof box about 100 feet north of U.S. Route 66

and 350 feet to the east of the residence. Measurement setup is shown in Photographs 12 and 13 of Appendix CC, Noise Measurements. A summary of the data from this long-term measurement can be found in Table-5.12-3, Long-Term Noise Measurement Data Summary, and hourly data for this location can be found in Appendix CC, Noise Measurements.

SCE Pisgah Substation

ST4

This measurement was located at the northeastern gate of the SCE Pisgah Substation off of Pisgah Crater Road. This location was selected to provide representative noise levels at the existing substation. The measurement setup is shown in Photographs 7 and 8 in Appendix CC, Noise Measurements.

Short-term daytime and nighttime measurements were conducted at this location. The daytime short-term measurement was conducted between 1410 and 1430 on November 7, 2008. Daytime noise sources included noise coming from the transmission lines at the substation, distant traffic contributions from I-40, and train pass-bys from the nearby rail line. The nighttime short-term measurement was conducted between 0030 and 0050 on November 7, 2008. The nighttime noise included noise coming from the transmission lines at the substation, distant traffic contributions from I-40, and train pass-bys from the nearby rail line. The daytime and the nighttime L_{eq} levels are shown in Table 5.12-2, Short-Term Noise Measurement Data Summary.

5.12.2 Environmental Consequences

Noise will be produced at the Project Site during its construction and operation. Potential noise effects from both categories of activity will be assessed in this section. Federal, state, and local LORS that apply to the Project are included in Section 5.12.5, Compliance with LORS. These include the General Plan noise element and Development Code of the County to determine the significance of Project-generated increases in noise levels. Based on state of California and San Bernardino County guidelines, environmental consequences of the Project would be considered significant if one or more of the following conditions are satisfied:

- Noise from Project construction takes place between 1900 and 0700 Monday through Friday, and Sundays/Federal Holidays.
- Noise from Project operations exceeds 55dBA L_{eq} at the nearest residence between 07:00 and 22:00.
- Noise from Project operations exceeds 45dBA L_{eq} at the nearest residence between 22:00 and 07:00.
- Based on CEC guidelines, if noise from the Project increases the existing background noise level by 5dBA or more, an impact may result.

5.12.2.1 Construction Noise

The construction schedule of the Project will take place in two phases over a period of 41 to 48 months. Heavy construction will be scheduled to occur between 0700 and 1900, Monday

through Friday. Additional hours may be necessary to make up schedule deficiencies or to complete critical construction activities. Some activities will continue 24 hours per day, 7 days per week. These activities include, but not limited to, SunCatcher assembly, refueling of equipment, staging of materials for the next day's construction activities, quality assurance/control, and commissioning.

During construction activities, a varying number of construction equipment and personnel will occupy the Project Area and result in varying levels of construction noise. The Project will utilize conventional construction techniques and equipment, including excavators, bulldozers, heavy trucks (e.g., water truck, dump truck), and similar heavy construction equipment. A limited amount of specialized construction using trenchers and cranes may also be needed.

Phase I includes construction of up to 20,000 SunCatchers, a Main Services Complex, arterial and Solar Field access roads, a transmission line from the Solar One Substation to the SCE Pisgah Substation, and an underground power collection system and fiber-optic network for the supervisory control and data acquisition system connection from the 1.5MW solar group blocks to the Solar One Substation. An 11-acre campus of multi assembly buildings will be constructed adjacent to the Main Services Complex for the on-site assembly of the SunCatchers. Also, an additional 26-acre construction laydown area will be located at approximately 0.5 mile north of the existing SCE Pisgah Substation.

Phase II includes construction of up to 14,000 SunCatchers, a Satellite Services Complex, arterial and Solar Field access roads, and an underground power collection system and fiber-optic network for the supervisory control and data acquisition system connection from the 1.5MW solar group blocks to the Solar One Substation. Also, a 26-acre construction laydown area will be located at north of I-40 and east of Hector Road. See Figure 5.12-1 for the location of the laydown area.

Contractors and equipment suppliers will use the two 26-acre laydown areas during construction to coordinate delivery of equipment and materials, construction, and for construction worker parking and processing.

Conventional construction activities at the Project would result in a short-term, temporary increase in the ambient noise level resulting from the operation of construction equipment. The increase in noise level would be primarily experienced close to the noise source. The magnitude of the noise effects would depend on the type of construction activity, noise level generated by construction equipment, duration of the construction phase(s), and the distance between the noise source and receiver.

Construction noise effects associated with the Project were assessed with spreadsheet-based noise calculations. User inputs are listed below.

- **Distance from Source:** the distance between the acoustic center of the construction activity and the considered receiver,
- **Duty Cycle:** the portion of an hour, in aggregate, that a piece of equipment is energized (stationary or mobile) and creating noise,
- **Quantity:** the number of equipment pieces or noise-producing events over a specific time period (e.g., equipment utilization per month), and

- **Hours:** the number of daytime hours (up to 12) that represent a typical daily work shift.

These inputs allow sound propagation prediction using the following formula:

L_{eq} = Source SPL + 10 * $\log_{10}$ (Duty Cycle) + 10 * $\log_{10}$ (Quantity) + 10 * $\log_{10}$ (Hours/12) - 20 * $\log_{10}$ (Distance from Source / Reference Distance)

where source sound pressure level (SPL) and reference distance describe the typical noise, associated with a single piece of equipment, measured at a pre-defined distance. For instance, a chainsaw may have a source SPL of 78dBA measured at a distance of 50 feet from its operator. Values for source SPL and reference distance have either been reproduced from available manufacturer's data or calculated from an industry-accepted formula linking sound generation to the rated engine horsepower of the equipment.

Due to the size of the Project area, construction noise is estimated separately for two types of construction activity.

SunCatcher Assembly and Installation

For purposes of this acoustical analysis, construction would proceed at the site at a rate of roughly one 18MW "block" of SunCatchers installed at a time, with the geographical center of the block serving as the effective acoustic center point for various stationary and mobile sound sources. Table 5.12-4, Estimated Construction Noise from Nearest 18MW Block to the Noise Sensitive Receivers, shows what the estimated construction noise levels will be solely from the 4-month long construction of a block nearest to the representative noise sensitive receivers. Construction of other blocks would be farther away, and hence produce quieter noise levels based on the fundamental principles of outdoor sound propagation. Equipment rosters and other input parameters from which these prediction results are based can be found in Appendix CC, Noise Measurements.

Table 5.12-4
Estimated Construction Noise from Nearest 18MW Block to the Noise Sensitive Receivers

Noise Sensitive Receivers	Distance to Receiver (feet)[1]	Maximum Sound Level (dBA) during 41 to 48-Month Construction Period
ST1[2]	1,300	76
SR1[3]	1,500	74
ST3[2]	2,950	69
SR2[3]	8,130	60

Source: Stirling Energy Systems, Inc., 2008.

Note:
[1] Distance from the center of 18MW Block construction site to each receiver.
[2] Sound level measurement locations.
[3] Noise Sensitive Receivers.

dBA = A-weighted decibel
ST# = Short Term measurement locations
SR# = Sensitive Receivers

Other Construction Noise

Aside from SunCatcher assembly and installation in the Solar Field, "other" construction noise intends to encompass sound generation from all other construction activity (SunCatcher manufacture, road construction, substation construction, etc.), with a geographic acoustical center located at the Main Services Complex throughout the course of the Project's construction. Table 5.12-5, Estimated Other Construction Noise Range for the Noise Sensitive Receivers, presents the estimated construction noise levels from this center point for the approximate four-year schedule. Equipment rosters and other input parameters from which these prediction results are based, can be found in Appendix CC, Noise Measurements.

Table 5.12-5
Estimated Other Construction Noise
for the Noise Sensitive Receivers

Noise Sensitive Receivers	Distance to Receiver (feet)[1]	Sound Level (dBA) Range Throughout 41 to 48-Month Period[2]
ST1[3]	23,600	48-55
SR1[4]	22,600	48-55
ST3[3]	11,800	54-61
SR2[4]	16,700	51-58

Source: Stirling Energy Systems, Inc., 2008.

Note:
[1] Distance from the center of the Main Services Complex construction site to each receiver.
[2] Sound levels depending on the utilization of construction equipment for each month.
[3] Sound level measurement locations.
[4] Noise Sensitive Receivers.

dBA = A-weighted decibel
ST# = Short Term measurement locations
SR# = Sensitive Receivers

Note that while many kinds of equipment are common to both types of construction activity, each has its own unique noise-producing elements. For instance, the "power line constructor trencher" is associated only with SunCatcher installation because of the collector system cables associated with SunCatcher units. The "asphalt paver," on the other hand, will be used largely at the Main Services Complex and, over the course of the Project's construction, may be in use at other Project locations to pave roads on the site, but not necessarily in proximity to the construction of a SunCatcher block.

As shown in Table 5.12-4, Estimated Construction Noise from Nearest 18MW Block to the Noise Sensitive Receivers, estimated SunCatcher block construction sound levels at representative off-site noise sensitive receivers would range from 60dBA to 76dBA L_{eq} during construction activity. Table 5.12-5, Estimated Other Construction Noise for the Noise Sensitive Receivers, indicates the estimated other construction sound levels at representative off-site noise sensitive receivers would range from 48dBA to61 dBA L_{eq}.

Predicted sound levels would exceed existing ambient sound levels by greater than 5dB; however, the potential impacts are considered to be temporary and therefore less than significant. (See Section 5.12.4, Mitigation Measures, for a presentation of mitigation steps intended to help reduce construction noise levels).

Occupational Noise

Compliance with California Department of Industrial Relations, Occupational Safety and Health Administration (Cal/OSHA) regulations will help ensure that construction personnel are adequately protected from potential noise hazards. The noise exposure level to protect worker hearing is regulated at 90dBA over an 8-hour work shift. The Project's contractors are required

to comply with all Cal/OSHA regulations. Occupational noise effects relating to Project construction is therefore considered to be less than significant.

Off-site Construction Laydown, Staging, and Parking Areas

An 11-acre construction laydown area will be built adjacent to the Main Services Complex. Also, two 26-acre construction laydown areas will be located approximately 0.5 north of the SCE Pisgah Substation for Phase I and at the northeast corner of Hector Road and I-40 for Phase II. Contractors and equipment suppliers will use the laydown areas during construction to coordinate delivery of equipment and materials, construction, and construction worker parking and processing.

The primary noise concern for the construction laydown areas would be the truck staging area. Pads will be prepared for setting down trailers that house the temporary construction facilities (offices, restrooms, meal rooms, meeting, and conference rooms, etc.). The soil in the laydown area will be covered with protective gravel along the access roadways, parking, and vehicle marshalling areas, or with construction material on dunnage in the material storage areas so that soil losses will be negligible. In the areas to be restored after their use as construction laydown areas, geo-tech fabric and gravel will be removed and shallow swales and/or depressions will be created for revegetation.

The closest sensitive receiver to the Phase I laydown area is the residence (SR2), approximately 7,700 feet to the east. Based on this distance, the estimated sound level from construction vehicles and activity associated with such a staging/laydown area (operating at an average level of 89dBA at 50 feet (EPA 1971) would be 45dBA. The closest sensitive receiver to the Phase II laydown area is the residence (SR1), approximately 4,500 feet to the southwest. Based on this distance, the estimated sound level from construction vehicles and activity associated with such a staging/laydown area would be 50dBA. The predicted sound level would not exceed the existing representative ambient sound levels obtained from the sound level measurements at ST1 for SR1, and ST3 for SR2 (Table 5.12-2, Short-Term Noise Measurement Data Summary).

In addition, the County Development Code, Section 83.01.080(g)(3) exempts temporary construction noise between 0700 and 1900 from Monday through Saturday. Therefore, the noise effect from the construction laydown area is anticipated to be less than significant.

Construction Traffic

There would be two access roads for the Solar One Project. One is at I-40 and Hector Road, another is the temporary access road that connects to I-40 from the eastern Project Area along the SCE Lugo-Pisgah Transmission Line Corridor.

During the construction period, there would be significant traffic increase to both Hector Road and the temporary access road. The increase of sound levels for both roadways would be expected greater than 5dBA since the existing peak hour traffic volumes were less than 10 traffics for both roadways. However, there would be no noise sensitive receivers along Hector Road and temporary access road. Therefore, the noise effect from the construction traffic is anticipated to be less than significant from Hector Road and temporary access road.

According to Section 5.11, Traffic and Transportation, the existing average daily traffic (ADT) volume for I-40 is 14,500. Based on the information obtained from Caltran's 2007 Average Annual Daily Traffic, the traffic mix for I-40 around the Project Area would be 5 percent for medium trucks and 40 percent for heavy trucks. The FHWA Traffic Noise Model Version 2.5 Look-Up Tables was used to determine the sound levels from I-40 traffic. The existing sound level at 100 feet from I-40 center line would be approximately 76.5dBA.

The ADT volume with construction traffic in Year 2011 for I-40 would be 17,000. The same methodology was used to determine the sound level during the construction period. The predicted sound level at 100 feet from I-40 center line would be approximately 77.2dBA.

The increase of sound level from existing condition would be less than 1dBA. Therefore, the estimated sound level from Project construction traffic would be considered a less than significant effect.

5.12.2.2 Operational Noise

Prediction Methods

The Cadna/A Noise Prediction Model (Version 3.7.124) was used to estimate the Project-generated sound pressure level at the property lines and noise-sensitive receivers. Cadna/A is a Windows-based software program that predicts and assesses noise levels near industrial noise sources based on International Standards Organization 9613-2 standards for noise propagation calculations. The model uses industry-accepted propagation algorithms and accepts sound power levels (in dB re: 1 picoWatt) provided by the equipment manufacturer and other sources. The calculations account for classical sound wave divergence plus attenuation factors resulting from air absorption, basic ground effects, and barrier/shielding. Intervening natural and man-made topographical barrier effects were considered appropriate, including those from structures such as major buildings, tanks, and large equipment.

Calculations were performed using linear octave band sound power levels as inputs from each pre-defined noise source, as summarized in Table 5.12-6, Noise Model Sound Level Parameters.

To quantify the sound contribution from individual SunCatchers, URS conducted field measurements in April 2008 at the Applicant's pilot facility located on the grounds of Sandia National Laboratories at Kirkland Air Force Base in Albuquerque, New Mexico. The survey provided distance-dependent SPL data from which octave-band resolution sound power level (PWL) was derived for the SunCatcher assemblies considered in this Project model.

For noise sources lacking Applicant-supplied sound data, sound levels were based on the appropriate calculation methods based on the information provided in the Project description. The Project configuration was imported into Cadna/A from available Project Computer Aided Design files. As operation of the Project is linked to solar exposure and monitored on an hourly basis, the Cadna/A model consequently predicts hourly sound levels. The formula used to derive the overall SPL (in dBA) from PWL is as follows: $SPL = PWL - 20 \log (r) - 10.9 + C$ where r is in meters and C is a dimensionless absorption constant (Harris).

Table 5.12-6
Noise Model Sound Level Parameters

Project Component	Type of Source	Sound Power Level (PWL) at Octave Band Center Frequency (Hz)									Unweighted (linear)	A-Weighted	Acoustic Height (feet)
		31.5	63	125	250	500	1,000	2,000	4,000	8,000			
SunCatcher[1]	Area	119	111	101	93	97	95	90	88	81	120	99	42.5
Power Transformer (Substation component)	Area	79	85	87	82	82	76	71	66	59	91	82	23

Source: URS Corporation, 2008.

Notes:

Sound levels presented in this table are the individual sound level for each component. Sound levels for the area sources in the model were calculated based on the number of each component within the identified area.

[1]SunCatcher assembly includes measured composite levels from the Stirling Engine, electric generator, cooling fan, and air compressor.

Hz = Hertz

PWL = power level

Community Noise

The full operation mode of the Project consists of approximately thirty-four thousand (34,000) SunCatcher assemblies and a Solar One Substation. The aggregate operational noises from this quantity of Suncatchers and electrical transmission equipment were modeled as large expanses of evenly distributed "area sources" (i.e., one of the techniques Cadna/A offers for modeling a sound source) at the heights of 42.5 feet for SunCatcher assemblies and 23 feet for power transformers at Solar One Substation. The model presumes all Suncatchers and associated transformers are operating at full functional capacity.

The results of the predictive calculations for this abovementioned operation scenario are summarized in Table 5.12-7, Operation Levels at Noise Sensitive Receivers. The table shows the existing, future predicted, and cumulative noise levels at the sensitive receivers. The cumulative noise levels, contributed by the Project at these off-site receivers, range from 52 to 69dBA L_{eq} during daytime hours (0700 to 2200.). See Figure 5.12-1 for L_{eq} Noise Contours.

Table 5.12-7
Calculated Operation Levels at Noise Sensitive Receivers

Noise-Sensitive Receiver	Distance to NSR (feet)/ Direction[1]	Daytime Average Noise Levels (L_{eq} dBA)		
		Existing	Future Predicted	Cumulative[2]
ST1[3] North of Route 66, west of Hector Rd, and west of the residence	1,000/ Southwest	57	57	60 (+3)
SR1[5] The residence south of Route 66 and west of Hector Rd.	1,200/ Southwest	57[6]	57	60 (+3)
ST3[4] At resident gate post to the west of the project area, north of railroad	2,600/ East	68	68	69 (+1)
SR2[5] The residence east of the project area, north of railroad	7,700/ East	NA[7]	52	52

Source: URS Corporation, 2008.

Notes:

[1] Distance is between NSR and the nearest project boundary.

[2] Cumulative noise levels are based on the logarithmic calculation of adding Existing and Future Predicted noise levels.

[3] Representative measurement location for SR1.

[4] Sound level measurement location at the gate of SR2, north of railroad.

[5] Noise Sensitive Receivers.

[6] Existing sound level at ST1 was considered representative ambient sound level due to the close proximity.

[7] No sound level measurement was conducted at SR2. Representative ambient sound level is not available.

\+ = Positive
dBA = A-weighted decibel
L_{eq} = Equivalent sound level
NSR = Noise Sensitive Receiver

As designed and described in the Project description (see Section 3.0, Project Description and Location), the cumulative noise level at SR2 would be in compliance with all applicable local LORS (limited to less than 55 dBA L_{eq} during daytime).

According the County Development Code (See Section 5.12.5.3, Local LORS), the Project generated sound levels shall not exceed the ambient sound level at the sensitive receiver. At SR1, the ambient sound level was assumed to be 57dBA during daytime hours. The future predicted sound level from the Project at SR1 would be 57dBA during daytime hours. In addition, an increase of sound levels at both sensitive receivers would be less than 5dBA. Therefore, operational noise from the Project with respect to existing noise sensitive receivers is anticipated to be less than significant.

Occupational Noise

Based on the power transmission equipment and large number of SunCatchers planned for the Project site, the noise levels inside the perimeter of the Project area would be similar in magnitude to comparably sized and equipped industrial projects. These high noise levels may require the use of hearing protection as specified by federal OSHA and Cal/OSHA guidelines for worker noise exposure. Compliance with Cal/OSHA regulations will ensure that personnel are adequately protected from potential noise hazards. The noise exposure level to protect hearing of workers is regulated at 90 dBA over an 8-hour work shift. Areas above 85 dBA will be posted as high noise level areas and hearing protection will be required. The Project owners will implement a hearing conservation program for applicable employees as outlined in Cal/OSHA regulations. The survey will be conducted after the facility is in full operation, and will be conducted by a qualified person in accordance with the provisions of Title 29, Code of Federal Regulations (CFR), Part 1910.95 (reviewed in Section 5.12.4.3) and Title 8, California Code of Regulations (CCR), Section 5095-5100 (Article 105) (reviewed in Section 5.12.4.3). On the expectation that the above policy will be fulfilled, occupational noise is considered to be less than significant.

Operational Traffic Noise

Although there will be a modest fleet of maintenance vehicles (including but not limited to those used for SunCatcher dish wash and Power Conversion Unit hydrogen gas refill), the quantity of vehicles operating either at the main services complex or spread across the Project Site is not expected to impart noise having an L_{eq} greater than the continuous operation of the SunCatchers. Thus, operational traffic noise is considered to be a less than significant.

Power Transmission

Noise sources associated with power transmission include occasional breaker operation in the substation, corona noise, and very low magnetostriction hum from the conductors. Breaker noise is considered impulsive in nature, lasting a very short duration and may occur only a few times per year. Corona noise is characterized as a buzz or hums and is usually worse when the conductors are wet, such as in rain or fog.

The Electric Power Research Institute (EPRI) has conducted noise tests and studies and has published reference material on transmission line noise. Consistent with all acoustic textbooks' discussion of propagation of noise from a line source, EPRI states that noise produced by a conductor decreases at a rate of 3dB per doubling of distance from the source. The EPRI Transmission Line Reference Book indicates that the audible noise from a typical 525-kV line with two conductors per phase would likely be less than 40 dBA at a distance of 40 feet from the outside conductor at ground level. If only one conductor per phase is used, the noise level will be less. Consistent with the Project description, the levels are expected to be less than described above because the transmission line used in the Project is 220kV (i.e., less than 525kV) (Stirling Energy Systems, Inc., 2008).

In support of the above, the existing SCE Pisgah Substation was measured to be 45dBA and 50dBA at the fence line (ST4), during daytime and nighttime measurements, respectively. The existing power transmission line measurement was measured to be 49dBA during a daytime

measurement directly under the transmission lines (LT1). The distance between the nearest residence's property line and the proposed transmission lines would be approximately 2,600 feet. Based on the calculation (6 dB decrease per doubling the distance), the predicted sound level at the nearest residence's property line would be less than 40dBA. Consequentially, the new power transmission equipment for the Project is predicted to have no audible sound contribution to the aforementioned existing resident. Thus, noise from the proposed transmission line is considered to be a less than significant.

5.12.3 Cumulative Effects

In order to assess cumulative noise impacts, the following projects have been identified in the vicinity of Solar One:

- transmission line upgrades (65 miles from the SCE Pisgah Substation following existing transmission lines),
- expansion of the SCE Pisgah Substation,
- proposed Solar Three, and
- wind and solar development to the east and west of the Project.

The nearest noise sensitive receiver to the transmission line upgrades and SCE Pisgah Substation expansion is SR2. The ambient sound levels described in Section 5.12.1.4, Ambient Noise Measurements, were below or at 50dBA Leq at LT1 and ST4. Since SR2 is approximately 7,700 feet east of the Project area, a significant impact would not be expected.

Solar Three would be built to the northwest of the the Project. Since the nearest noise sensitive receiver (SR1) is further away from Solar Three, a significant cumulative increase of noise levels due to Solar Three would not be expected.

The proposed wind power facility to the east of the Project would potentially have an impact to SR2. The details of noise data from the proposed wind power facility are not available to assess its cumulative noise impacts to SR2 at this time. Therefore, further analysis with this data, when available, is recommended.

For these reasons, and with respect to these other projects in the vicinity, the Project is not expected to result in significant cumulative effects related to noise during construction, concurrent construction and partial Project operation, and full operation when construction is complete.

5.12.4 Mitigation Measures

5.12.4.1 Off-Site Operation

As operational noise impacts are expected to be less than significant for the Project, there is no corresponding need for mitigation.

5.12.4.2 Construction

Construction of the Project would temporarily elevate noise levels in the surrounding community. Most often the sound levels would be moderate, with a few processes causing short-term, substantially elevated noise levels to occur. Because construction would be of a limited duration, activities that generate the most noise would be conducted during daylight hours, and because best practices for construction noise control will be implemented, no adverse construction noise effects are expected to occur in the surrounding community.

To help ensure that noise emission assumptions relied on herein are valid and acoustical design goals can be met by the Project during construction, the following Conditions of Certification are recommended:

NOISE-1

Construction noise emissions shall comply with the local LORS regarding hours of construction activity and permitted noise levels affecting adjacent uses.

NOISE-2

All noise-producing Project equipment and vehicles using internal combustion engines shall be equipped with mufflers, air-inlet silencers, where appropriate, and any other shrouds, shields, or other noise-reducing features in good operating condition that meet or exceed original factory specification. Mobile or fixed "package" equipment (e.g., arc-welders, air compressors) shall be equipped with shrouds and noise control features that are readily available for that type of equipment.

NOISE-3

All mobile or fixed noise-producing equipment used on the Project, which is regulated for noise output by a local, state, or federal agency, shall comply with such regulation while in the course of Project activity.

NOISE-4

The use of noise-producing signals, including horns, whistles, electronic alarms, sirens, and bells, will be for safety warning purposes only.

NOISE-5

No construction-related public address, loudspeaker, or music system shall be audible at any adjacent noise-sensitive land use.

NOISE-6

Additionally, the contractors shall implement a noise complaint process and hotline number for the surrounding community. The Applicant will have the responsibility and authority to receive and resolve noise complaints.

5.12.4.3 On-Site Occupational Noise Exposure

NOISE-7

Within 30 days of Phase I of the Project going online, the Applicant shall conduct an occupational noise survey to verify modeled noise levels and identify any additional noise hazard areas in the Project facilities. The survey shall be conducted by a qualified person in accordance with the provisions of Title 8 California Code of Regulations, Sections 5095-5099 (Article 105) and Title 29, Code of Federal Regulations (CFR), Section 1910.95. The survey results shall be used to determine the magnitude of employee noise exposure. Areas above 85dBA that may be accessed by any personnel shall be posted as high noise level areas. Hearing protection shall be furnished and their use required in the posted areas.

NOISE-8

The Applicant shall prepare a report of the survey results and, if necessary, identify proposed measures that will be employed to comply with applicable state and federal regulations. Within 30 days of completing the survey, the Project owner shall submit the noise survey report to the Construction Project Manager. The Applicant shall make the report available to the Occupational Safety and Health Administration and Cal/OSHA on request.

5.12.5 Compliance with LORS

5.12.5.1 Federal

There are no federal LORS that directly affect this Project with respect to noise. However, the following guidelines at the federal level direct the consideration of a broad range of noise and vibration issues:

- the National Environmental Policy Act of 1969 (42 United States Code 4321, *et seq*.) (Public Law 91-190) (40 CFR §1506.5), and
- the Noise Control Act of 1972 (42 United States Code 4910).

The EPA has not promulgated standards or regulations for environmental noise generated by power plants; however, the EPA has published a guideline that specifically addresses issues of community noise (EPA Levels Document, Report Number 556/9-74-664). This guideline, commonly referred to as the "Levels Document," contains goals for noise levels affecting residential land use of L_{dn} <55 dBA for exterior levels and L_{dn} <45 dBA for interior levels.

Section 202(c)(1-9) of the Land Use Planning Handbook (BLM 1988) requires that land use planning comply with all applicable state and federal noise pollution standards, but does not provide specific noise standards.

Occupational exposure to noise is regulated by Title 29, CFR, Part 1910.95 occupational noise exposure. Protection against the effects of noise exposure shall be provided when the time-weighted average (TWA) sound levels exceed 90 dBA for an 8-hour period. When employees are subjected to sound exceeding this limit, feasible administrative or engineering controls shall

be utilized. If such controls fail to reduce TWA sound levels within 90dBA, personal protective equipment (PPE) shall be provided and used to reduce sound levels to within limits. The employer shall administer a continuing, effective hearing conservation program whenever employee noise exposures equal or exceed an 8-hour TWA sound level of 85 decibels measured in dBA (slow response) or, equivalently, a dose of 50 percent. For purposes of the hearing conservation program, employee noise exposures shall be computed in accordance with CFR 1910.95, Appendix A (Noise Exposure Computation) without regard to any attenuation provided by the use of PPE.

5.12.5.2 State

The CEC has been delegated the authority to act as the lead agency for purposes of compliance with the California Environmental Quality Act (CEQA) (Public Resources Code Division 13, Environmental Protection, Section 21000 *et seq*.).

Occupational exposure to noise is regulated by Cal/OSHA in Title 8, Group 15, Article 105, Sections 5095 to 5100. The standard stipulates that protection against the effects of noise exposure shall be provided when sound levels exceed 90 dBA over an 8-hour exposure period. Protection shall consist of feasible administrative or engineering controls. If such controls fail to reduce sound levels to within acceptable levels, personal protective equipment (PPE) shall be provided and used to reduce exposure to the employee. Additionally, a hearing conservation program must be instituted by the employers whenever employee noise exposure equals or exceeds the action level of an 8-hour TWA sound level of 85 dBA. The hearing conservation program requirements consist of periodic area and personal noise monitoring, performance and evaluation of audiograms, provision of hearing protection, annual employee training, and record keeping.

The state also requires local jurisdictions (California Government Code Section 65302(f)) to prepare general plans that include land use and noise elements.

CEQA requires identification of significant environmental impacts and their feasible mitigation. Section XI of Appendix G of CEQA Guidelines (Cal. Code Regs., tit. 14, App. G) lists some indicators of potentially significant impacts that include the following:

a. exposure of persons to or generation of noise levels in excess of standards established in the local General Plan or noise ordinance, or applicable standards of other agencies,

b. exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels,

c. a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the Project,

d. a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the Project,

e. for a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, the Project exposes people residing or working in the project area to excessive noise level, and.

f. for a project within the vicinity of a private airstrip, the project exposes people residing or working in the project area to excessive noise levels.

5.12.5.3 Local

San Bernardino County

The Project Site and environs are unincorporated areas within and governed by San Bernardino County. Project noise and any noise-sensitive use must comply with General Plan and County Development Code established for maintaining noise/land use compatibility between residential and industrial land uses.

General Plan

The Noise Element of the General Plan uses Section 83.01.080 of the County Development Code to set performance standards for affected land use from stationary and mobile noise sources, during daytime (0700 to 2200) and nighttime (2200 to 0700) periods. County Development Code 83.01.080 establishes standards concerning acceptable noise levels for both noise-sensitive land uses and for noise-generating land uses.

County Development Code

The County Development Code, Section 83.01.080(c)(1), identifies a noise impacted area as an area that may be exposed to existing or projected future exterior noise levels from stationary sources exceeding the standards listed in Table 5.12-8. New development of residential or other noise-sensitive land use shall not be allowed in noise-impacted areas unless effective mitigation measures are incorporated into the project design to reduce noise levels to these standards.

Table 5.12-8 below demonstrates the noise standards categorized by affected land use for stationary noise sources.

Table 5.12-8

San Bernardino County Noise Standards for Stationary Noise Sources

Affected Land Uses	0700 to 2200 Leq	2200 to 0700 Leq
Residential	55 dBA	45 dBA
Professional Services	55 dBA	55 dBA
Other Commercial	60 dBA	60 dBA
Industrial	70 dBA	70 dBA

The County Development Code, Section 83.01.080(c)(2), categorizes the cumulative effect of noise from adjacent land uses. It states that no person shall operate or cause to operate a source

of sound at a location or allow the creation of noise on property owned, leased, occupied, or otherwise controlled by the person, who causes the noise level, when measured on another property, either incorporated or unincorporated, to exceed any of the following:

A. the noise standard for the receiving land use as specified in Table 5.12-8, for a cumulative period of more than 30 minutes in any hour,

B. the noise standard plus 5dBA for a cumulative period of more than 15 minutes in any hour,

C. the noise standard plus 10dBA for a cumulative period of more than 5 minutes in any hour,

D. the noise standard plus 15dBA for a cumulative period of more than 1 minute in any hour, and

E. the noise standard plus 20dBA for any period of time.

If the measured ambient level exceeds any of the first four noise limit categories above, the allowable exposure standard shall be increased to reflect the ambient noise level. If the ambient noise level exceeds the fifth noise limit category above (E), the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

If the alleged offense consists entirely of impact noise or simple tone noise, each of the noise levels in Table 5.12-8 shall be reduced by 5 dBA.

The County Development Code, Section 83.01.080(g)(3), describes that temporary construction, maintenance, repair, or demolition activities between 0700 and 1900., except Sundays and Federal holidays, are exempt.

Table 5.12-9
Summary of LORS – Noise

LORS	Requirements	Conformance Section	Administering Agency
Federal Jurisdiction			
National Environmental Policy Act of 1969 (42 USC 4321, *et seq*.) (PL-91-190) (40 CFR §1506.5)	Not applicable by statute.	Section 5.12.5.1	EPA
State Jurisdiction			
California Energy Commission 140-2006-002	Increase over existing background noise level of 5dBA or greater at noise-sensitive areas is significant.	Section 5.12.5.2	CEC
California Occupational Safety and Health Administration 8 CCR, General Industrial Safety Orders, Article 105	Levels over 85dBA at 8-hour work station require hearing conservation.	Section 5.12.5.2	Cal/OSHA
Local Jurisdiction			
General Plan Noise Element	Referred to Section 83.01.080 of the County's Development Code	Section 5.12.5.3	San Bernardino County

Table 5.12-9
Summary of LORS – Noise

LORS	Requirements	Conformance Section	Administering Agency
County Development Code 83.01.080	55dBA Leq between 0700 and 2200 45dBA Leq between 2200 and 0700 Temporary construction taking place between 0700 and 1900 Monday through Saturday, except federal holidays is exempted.	Section 5.12.5.3	San Bernardino County

Source: URS Corporation, 2008.

Notes:
Cal/OSHA = California Occupational Health and Safety Administration
CCR = California Code of Regulations
CEC = California Energy Commission
CFR = Code of Federal Regulations
dB = decibels
dBA = A-weighted decibel
EPA = Environmental Protection Agency
LORS = laws, ordinances, regulations, and standards
PL = Public Law
USC = United States Code

5.12.5.4 Agencies and Agency Contacts

Agencies with jurisdiction to enforce LORS related to noise are shown in Table 5.12-10, Agency Contact List for LORS.

Table 5.12-10
Agency Contact List for LORS

	Agency	Contact	Address	Telephone
1	California Energy Commission	Steve Baker	1516 Ninth Street Sacramento, CA 95814	916-654-3915

Source: URS Corporation, 2008.

Note:
LORS = laws, ordinances, regulations, and standards

5.12.5.5 Permits Required and Permitting Schedule

As shown in Table 5.12-11, Applicable Permits, no permits are required for the Project in the area of noise.

Table 5.12-11
Applicable Permits

Responsible Agency	Permit/Approval	Schedule
Federal	None required	Not applicable
State	None required	Not applicable
Local	None required	Not applicable

Source: URS Corporation, 2008.

5.12.6 References

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United States Department of Transportation, Federal Transit Administration. May 2006, FTA-VA-90-1003-06. Transit Noise and Vibration Impact Assessment. (Prepared under contract by Harris, Miller, Miller, and Hanson). Burlington, Massachusetts. April.

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Adequacy Issue:	Adequate		Inadequate		**DATA ADEQUACY WORKSHEET**	Revision No.	0	Date	
Technical Area:	**Noise**				Project:	SES Solar One		Technical Staff:	
Project Manager:					Docket:			Technical Senior:	

SITING REGULATIONS	**INFORMATION**	**AFC SECTION NUMBER**	**ADEQUATE YES OR NO**	**INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS**
Appendix B (g) (1)	...provide a discussion of the existing site conditions, the expected direct, indirect and cumulative impacts due to the construction, operation and maintenance of the project, the measures proposed to mitigate adverse environmental impacts of the project, the effectiveness of the proposed measures, and any monitoring plans proposed to verify the effectiveness of the mitigation.	Section 5.12.1 Section 5.12.2 Section 5.12.3 Section 5.12.4		
Appendix B (g) (4) (A)	A land use map which identifies residences, hospitals, libraries, schools, places of worship, or other facilities where quiet is an important attribute of the environment within the area impacted by the Project. The area potentially impacted by the Project is that area where, during either construction or operation, there is a potential increase of 5 dB(A) or more, over existing background levels.	Figure 5.12-1		

Adequacy Issue:	Adequate		Inadequate		**DATA ADEQUACY WORKSHEET**	Revision No.	0	Date	
Technical Area:	**Noise**			Project:	SES Solar One		Technical Staff:		
Project Manager:				Docket:			Technical Senior:		

SITING REGULATIONS	INFORMATION	AFC SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (4) (B)	A description of the ambient noise levels at those sites identified under subsection (g)(4)(A) which the applicant believes provide a representative characterization of the ambient noise levels in the project vicinity, and a discussion of the general atmospheric conditions, including temperature, humidity, and the presence of wind and rain at the time of the measurements. The existing noise levels shall be determined by taking noise measurements for a minimum of 25 consecutive hours at a minimum of one site. Other sites may be monitored for a lesser duration at the applicant's discretion, preferably during the same 25-hour period. The results of the noise level measurements shall be reported as hourly averages in Leq (equivalent sound or noise level), Ldn (day-night sound or noise level) or CNEL (Community Noise Equivalent Level) in units of dB(A). The L10, L50, and L90 values (noise levels exceeded 10 percent, 50 percent, and 90 percent of the time, respectively) shall also be reported in units of dB(A).	Section 5.12.1.4 Table 5.12-2 Table 5.12-3 Appendix CC, Noise Measurements		
Appendix B (g) (4) (C)	A description of the major noise sources of the project, including the range of noise levels and the tonal and frequency characteristics of the noise emitted.	Table 5.12-6		
Appendix B (g) (4) (D)	An estimate of the project noise levels, during both construction and operation, at residences, hospitals, libraries, schools, places of worship or other facilities where quiet is an important attribute of the environment, within the area impacted by the proposed Project.	Table 5.12-4 Table 5.12-5 Table 5.12-7		

Adequacy Issue:	Adequate		Inadequate		**DATA ADEQUACY WORKSHEET**	Revision No.	0	Date	
Technical Area:	**Noise**		Project:	SES Solar One		Technical Staff:			
Project Manager:			Docket:			Technical Senior:			

SITING REGULATIONS	INFORMATION	AFC SECTION NUMBER	ADEQUATE YES OR NO	INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS
Appendix B (g) (4) (E)	An estimate of the project noise levels within the project site boundary during both construction and operation and the impact to the workers at the site due to the estimated noise levels.	Section 5.12.2.1 Section 5.12.2.2		
Appendix B (g) (4) (F)	The audible noise from existing switchyards and overhead transmission lines that would be affected by the project and estimates of the future audible noise levels that would result from existing and proposed switchyards and transmission lines. Noise levels shall be calculated at the property boundary for switchyards and at the edge of the rights-of-way for transmission lines.	Section 5.12.1.4 Table 5.12-2 Table 5.12-3		
Appendix B (i) (1) (A)	Tables which identify laws, regulations, ordinances, standards, adopted local, regional, state, and federal land use plans, leases, and permits applicable to the Project, and a discussion of the applicability of, and conformance with each. The table or matrix shall explicitly reference pages in the application wherein conformance, with each law or standard during both construction and operation of the facility is discussed; and	Table 5.12-9		
Appendix B (i) (1) (B)	Tables which identify each agency with jurisdiction to issue applicable permits, leases, and approvals or to enforce identified laws, regulations, standards, and adopted local, regional, state and federal land use plans, and agencies which would have permit approval or enforcement authority, but for the exclusive authority of the commission to certify sites and related facilities.	Table 5.12-11		

Adequacy Issue:	Adequate		Inadequate		**DATA ADEQUACY WORKSHEET**	Revision No.	0	Date	
Technical Area:	**Noise**				Project:	SES Solar One		Technical Staff:	
Project Manager:					Docket:			Technical Senior:	

SITING REGULATIONS	**INFORMATION**	**AFC SECTION NUMBER**	**ADEQUATE YES OR NO**	**INFORMATION REQUIRED TO MAKE AFC CONFORM WITH REGULATIONS**
Appendix B (i) (2)	The name, title, phone number, address (required), and email address (if known), of an official who was contacted within each agency, and also provide the name of the official who will serve as a contact person for Commission staff.	Table 5.12-10		
Appendix B (i) (3)	A schedule indicating when permits outside the authority of the commission will be obtained and the steps the applicant has taken or plans to take to obtain such permits.	N/A		

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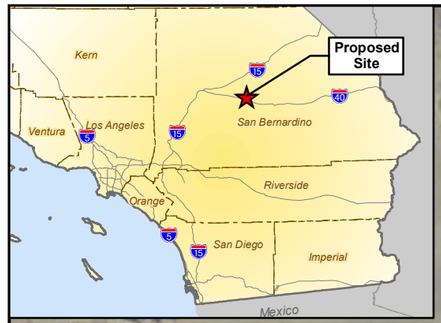

Solar 1 (Phase 2)
N.A.P.
Solar 1 (Phase 1)
LT1
Proposed Main Services Complex
ST2
Proposed Solar One Substation
N.A.P.
Solar 1 (Phase 2)
Proposed Satellite Services Complex
ST1
LT3
SR1
N.A.P.
LT2
ST4
ST3
SR2
Pisgah Substation
40

LEGEND

- Modeled Sensitive Receiver
- Short-Term Measurement Location
- Long-Term Measurement Location
- Project Boundary
- N.A.P. (Not a Part)
- Proposed Transmission Line
- Proposed Construction Staging Area
- Permanent Access Road
- I-40 Temporary Construction Access Road
- Proposed Water Well
- Road
- BNSF Railroad

L_{eq} Noise Contours

- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA

SOURCES:
Stantec Engineering (project site Oct. 2008);
URS (measurement level survey Nov. 2008);
TIGER (railroad 2000); ESRI (overview);
URS (noise model and monitoring locations, I-40 access rd); USDA (NAIP aerial 2005).

SOUND LEVEL MEASUREMENT LOCATIONS AND L_{eq} NOISE CONTOURS SOLAR ONE PROJECT

URS

2500 0 2500 5000 Feet

SCALE: 1" = 5000' (1:60,000)
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: LG	DATE: 11-14-08	FIG. NO: 5.12-1
PM: WM	PROJ. NO: 27658182.10000	

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